Spot Safety Project Evaluation

Project Log # 200611076

Spot Safety Project # 09-99-228

Spot Safety Project Evaluation of the Directional Crossover Installation on US 29 – 70 / I-85 Business at SR 1774 (Mendenhall St) in Davidson County

Documents Prepared By:

Safety Evaluation Group
Traffic Safety Systems Management Section
Traffic Engineering and Safety Systems Branch
North Carolina Department of Transportation

Principal Investigator

_____ 2-13-2007
Jason B. Schronce Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 09-99-228 - Directional Crossover Installation on US 29-70 / I-85 Business at SR 1774 (Mendenhall St) in Davidson County.

Project Information and Background from the Project File Folder

US 29-70 / I-85 Business is a four-lane divided roadway where is intersects with SR 1774 (Mendenhall St.). I-85B has dedicated left and right turn lanes and a speed limit of 55 mph. SR 1774 is a two-lane roadway without left turn lanes and a speed limit of 35 mph. The intersection is controlled by a stop condition on Mendenhall Street. The original crash study was from September 1, 1996 through September 1, 1999 with 13 total crashes. There were 11 crashes that were considered correctable by the proposed improvements at the intersection. There was 1 Class A and 4 Class C injuries that resulted from these crashes.

The original problem statement was that angle crashes were occurring due to vehicles crossing a high volume road. The improvement chosen for the subject location was to install a directional crossover on US 29 – 70 / I-85 Business to prohibit left turn and straight through movements from SR 1774 and allow left turn movements from I-85B.

The final completion date for the improvement at the subject location was on July 31, 2002 at a cost of $65,000.

Naive Before and After Analysis

After reviewing the spot safety project file folder along with all the crashes along the subject road, the crash data omitted from this analysis to consider for an adequate construction period was from April 2002 to November 2002. The before period consisted of reported crashes from July 1, 1998 through March 31, 2002 (3 years, 9 Months) and the after period consisted of reported crashes from December 1, 2002 through August 31, 2006 (3 Years, 9 Months). The ending date for this analysis was determined by the available crash data at the time the crash analysis was completed.

The treatment data consisted of all crashes within 150 feet of the subject intersection. The following data table (Table 1) depicts the Naive Before and After Analysis for the above information. Please note that Frontal Impact crash types were the target crashes for the applied countermeasure. These crash types considered are as follows: Left Turn, same roadway; Left Turn, different roadway; Right Turn, same roadway; Right Turn, different roadway; Head On and Angle.

A naïve before and after analysis was also completed at the U-turns located at milepost 17.66 (I-85B at North Ave) for westbound traffic and milepost 18.54 (I-85B at NC 68 / National Hwy) for eastbound traffic. Past studies have shown that if a movement were eliminated in one area, traffic

could migrate to another location to continue on their path. The data provided is for your information to see if crash migration has occurred and the effects it may have. (see Table 2)

Treatment Information

	Before	After	Percent Reduction (-) Percent Increase (+)
Total crashes	26	6	- 76.92 %
Total Severity Index	5.27	4.70	- 10.82 %
Frontal Impact Crashes	21	2	- 90.48 %
Frontal Severity Index	5.23	4.70	- 10.13 %
Volume	21,800	23,000	5.50 %

Treatment Injury Crashes

	Before	After	Percent Reduction (-) Percent Increase (+)
Fatal	0	0	N/A
Class A	0	0	N/A
Class B	5	2	- 60.00 %
Class C	10	1	- 90.00 %
Property Damage Only	11	3	- 72.73 %

Frontal Injury Crashes

	Before	After	Percent Reduction (-) Percent Increase (+)
Fatal	0	0	N/A
Class A	0	0	N/A
Class B	3	0	- 100.00 %
Class C	9	1	- 88.89 %
Property Damage Only	9	1	- 88.89 %

Table 1.

The naive before and after analysis at the treatment location resulted in a 77 percent decrease in Total Crashes, a 90.5 percent decrease in Frontal Impact Crashes and a 5.5 percent increase in Average Daily Traffic (ADT). The before period ADT year was 2000 and the after period ADT year was 2004.

Results and Discussion

The naïve before and after analysis involving the comparison of treatment before data versus treatment after data resulted in a 77 percent decrease in Total Crashes and a 90.5 percent decrease in Frontal Impact Crashes. The summary results above demonstrate that the treatment location appears to have had a decrease in the number of Total Crashes and a decrease in the number of Frontal Impact Crashes from the before to the after period.

Referencing the collision diagrams there were two after period frontal impact crashes. The crashes involved a left turning and a right turning vehicle from eastbound I-85 Business. During the field visit photos were taken looking downstream of eastbound US 64. When approaching the treatment

intersection with Mendenhall, I-85B does not have sight distance issues but sometimes it is hard to judge the traveling speeds of the approaching vehicles on the long straight roadway.

The treatment of the directional crossover at this intersection proved beneficial to reducing frontal impact collisions without the reverse effect of another crash pattern developing.

The following table shows the naïve before and after analysis completed at the U-turns located at milepost 17.66 (southwest location) and milepost 18.54 (northeast location). The northeast U-turn location is situated at the interchange of I-85B at National Hwy. The target crashes for this study included all crashes involved in the U-turn movement, including left-hand turns from the eastbound I-85B off-ramp and left-hand turns onto the westbound I-85B on-ramp. (see aerial for additional information)

Southwest
I-85B at North Ave

	Before	After	Percent Reduction (-) Percent Increase (+)
Total Crashes	2	2	N/A
Total Severity Index	38.9	0.0	- 100.00 %
U-turn Related Crashes	0	2	200.00 %
Volume	21,100	22,200	5.21 %

Northeast U-turn
I-85B at National Hwy

	Before	After	Percent Reduction (-) Percent Increase (+)
Total Crashes	39	64	64.10 %
Total Severity Index	3.66	3.08	- 15.84 %
U-turn Related Crashes	12	13	8.33 %
Volume	38,000	40,600	6.84 %

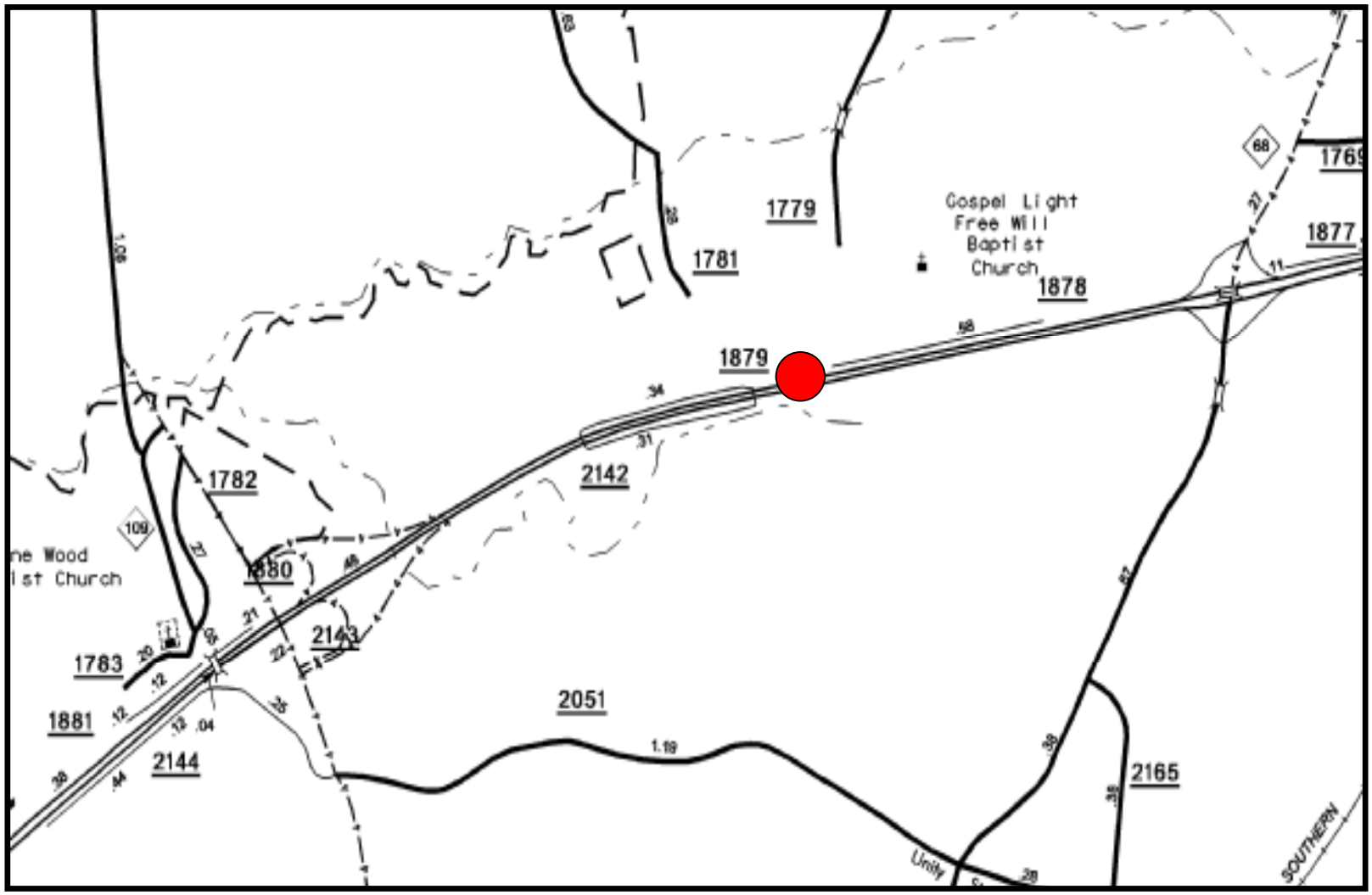
Table 2.

From the table above, there appears to be minimal evidence of crash migration in response to the installation of the directional crossover. Even though total crashes increased by 64 percent at the northeast U-turn location, we observed little increase in crashes involving the U-turn movements of the interchange. The volume increase at the northeast location is also non-substantial to conclude that additional traffic is using this interchange as an alternative for making left-hand turns from Mendenhall Street.

Also, referencing the table above, the southwest U-turn location poses two after period crashes that are both U-turn related. The effect on this intersection also appears minimal considering the complete reduction of the severity index.

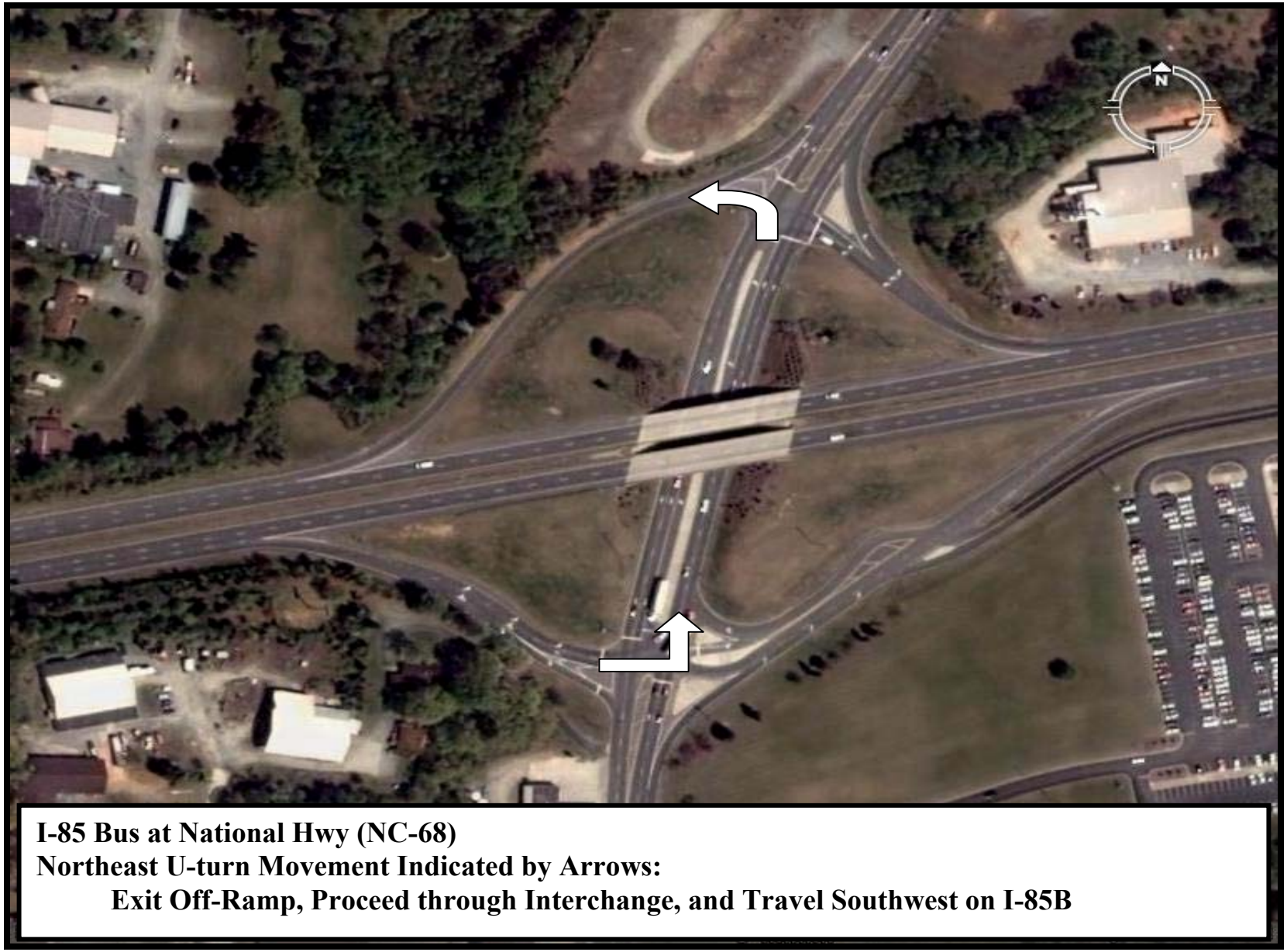
As the Safety Evaluation Group completes additional spot safety reviews for this type of countermeasure, we will be able to provide objective and definite information regarding actual crash reduction factors for this type of road.

Location Map
Davidson County
Evaluation of Spot Safety Project # 09-99-228



Treatment Location: US-29 / US-70 / I-85 Business and SR 1774 (Mendenhall Street)

Directional Crossover at the Intersection of I-85 Bus and SR 1774 (Mendenhall Rd)



I-85 Bus at National Hwy (NC-68)
Northeast U-turn Movement Indicated by Arrows:
Exit Off-Ramp, Proceed through Interchange, and Travel Southwest on I-85B

Treatment Site Photos taken December 19, 2006

Driving east on I-85 Business

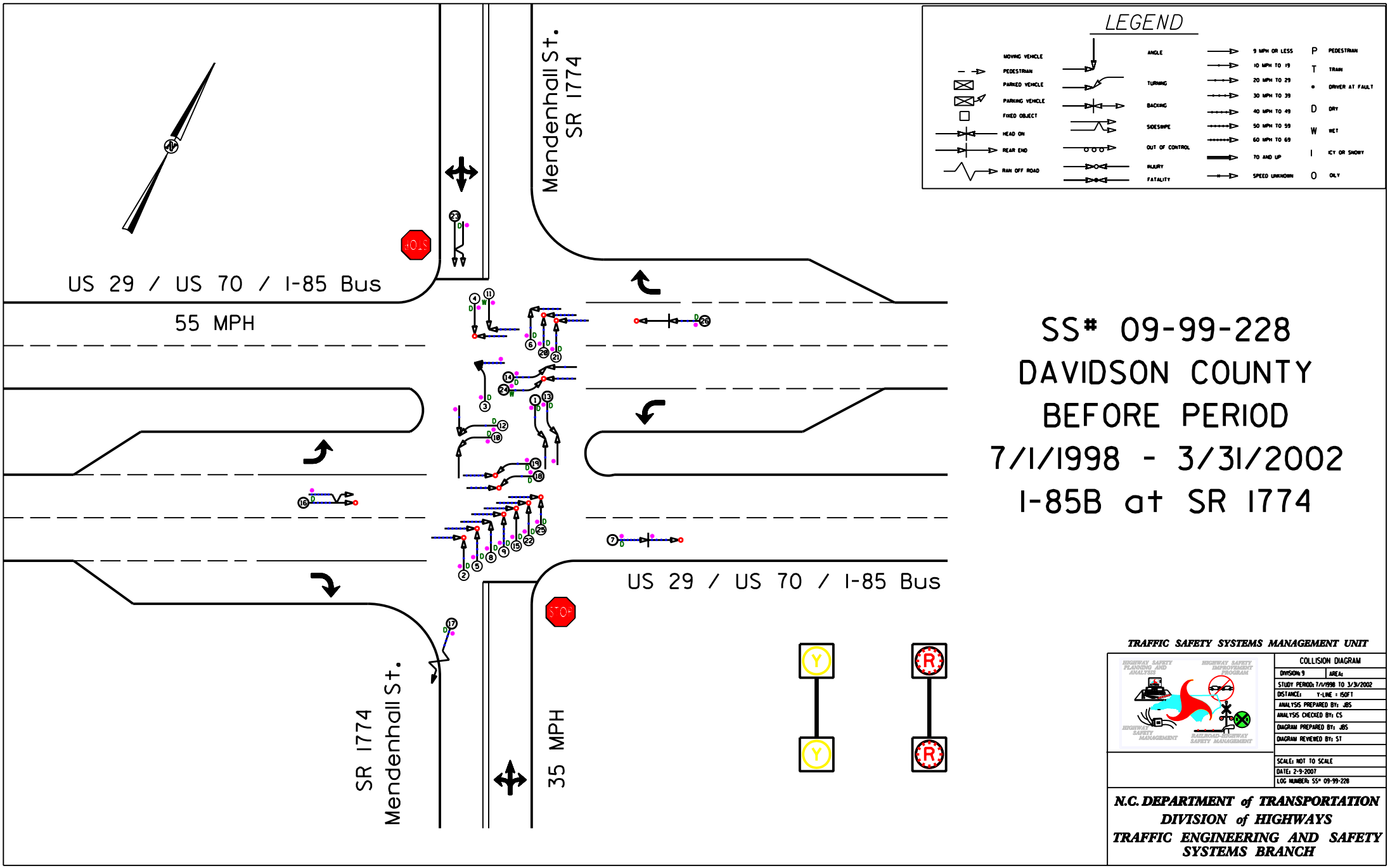
On SR 1774 looking South

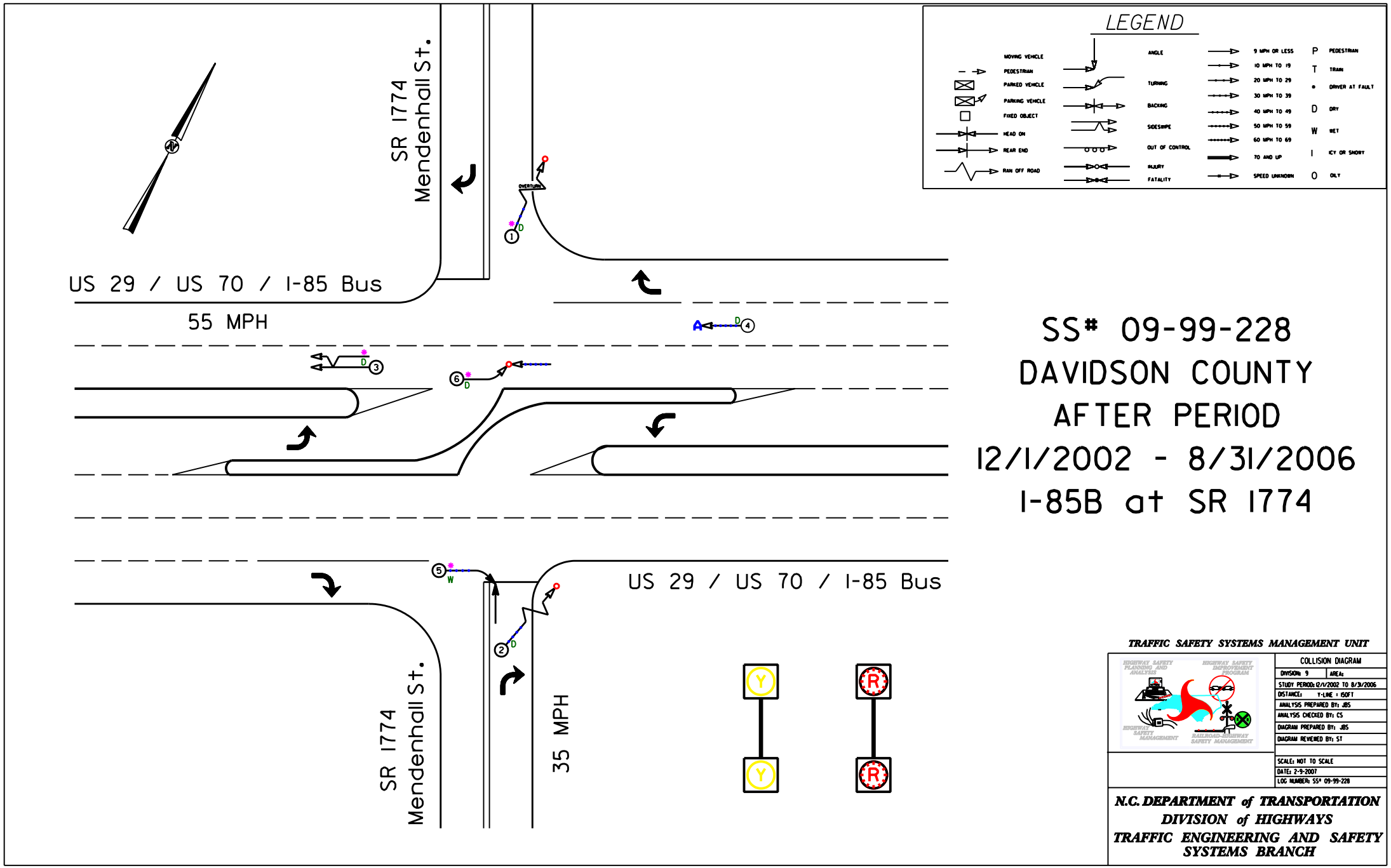
Driving north on Mendenhall St toward I-85B


Driving West on I-85B at Southwest U-turn Location

I-85B off-ramp onto National Hwy (Northeast U-turn Location)

On National Hwy turning left onto I-85B WB On-ramp


LEGEND
MOVING VEHICLE
PEDESTRIAN
PARKED VEHICLE
PARKING VEHICLE
FIXED OBJECT
HEAD ON
REAR END
RAN OFF ROAD
ANGLE
TURNING
BACKING
SIDESWIPE
OUT OF CONTROL
INJURY
FATALITY
9 MPH OR LESS
10 MPH TO 19
20 MPH TO 29
30 MPH TO 39
40 MPH TO 49
50 MPH TO 59
60 MPH TO 69
70 AND UP
SPEED UNKNOWN
P PEDESTRIAN
T TRAIN
* DRIVER AT FAULT
D DRY
W WET
I ICY OR SNOWY
O OILY
Mendenhall St.
SR 1774
US 29 / US 70 / I-85 Bus
55 MPH
STOP
US 29 / US 70 / I-85 Bus
SR 1774
Mendenhall St.
35 MPH
SS# 09-99-228
DAVIDSON COUNTY
BEFORE PERIOD
7/1/1998 - 3/31/2002
I-85B at SR 1774
TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT
COLLISION DIAGRAM
DIVISION: 9
AREA:
STUDY PERIOD: 7/1/1998 TO 3/31/2002
DISTANCE: Y-LINE = 150FT
ANALYSIS PREPARED BY: JBS
ANALYSIS CHECKED BY: CS
DIAGRAM PREPARED BY: JBS
DIAGRAM REVIEWED BY: ST
SCALE: NOT TO SCALE
DATE: 2-9-2007
LOG NUMBER: SS# 09-99-228
N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH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SR 1774
Mendenhall St.
US 29 / US 70 / I-85 Bus
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OVERTURN
US 29 / US 70 / I-85 Bus
SR 1774
Mendenhall St.
35 MPH
SS# 09-99-228
DAVIDSON COUNTY
AFTER PERIOD
12/1/2002 - 8/31/2006
I-85B at SR 1774
TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT
COLLISION DIAGRAM
DIVISION: 9
AREA:
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